

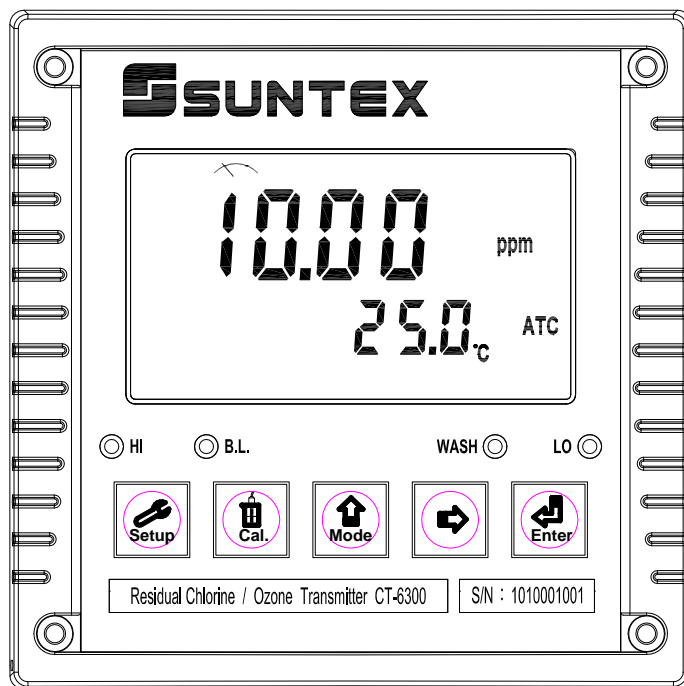
CT-6300RS

Microprocessor

Residual Chlorine/ Ozone

Transmitter

Operation
Manual



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1. Specifications

Model		CT-6300RS
Measuring modes		Residual(Free) Chlorine / Ozone / Temperature
Ranges	Cl₂	0.00~100.00 ppm(mg/l), depends on sensor
	O₃	0.00~20.00 ppm(mg/l), depends on sensor
	TEMP	-30.0~130.0°C
Resolutions	Cl₂	0.01 ppm(mg/l)
	O₃	0.01 ppm(mg/l)
	TEMP	0.1°C
Accuracy	Cl₂	±0.5%±1Digit
	O₃	±0.5%±1Digit
	TEMP	±0.2°C±1Digit
Temperature Compensation		Automatic with PT-1000 / NTC-30K or manual adjustment
Ambient Temp.		0~50°C
Storage Temp.		-10~70°C
Display		LCD display with sensitization sensor for auto/manual illumination function
Analog output		Isolated DC 0/4~20mA corresponding to residual chlorine/ ozone measurement, max. load 500Ω
Serial Interface		RS-485(MODBUS RTU or ASCII)
Settings	Contact	240VAC, 0.5A Max. (recommend)
	Activate	Hi/Lo two limited programmable
Wash	Contact	240VAC, 0.5A Max. (recommend)
	Time	ON: 0 9999 sec. / OFF: 0.0 999.9 hours
Voltage output		DC±8V , 0.5W Max.
Power Supply		100V~240VAC±10%, 5W Max., 50/60Hz
Installation		Wall or Pipe or Panel Mounting
Dimensions		144 mm × 144 mm × 115 mm (H×W×D)
Cut off Dimensions		138 mm × 138 mm (H×W)
Weight		0.82Kg
Protection		IP 65 (NEMX 4X)

Note: The specifications and appearance of the instrument are subject to change without notice.

2. Precautions for installation

Wrong wiring will lead to breakdown or electrical shock of the instrument, please read this operation manual clearly before installation.

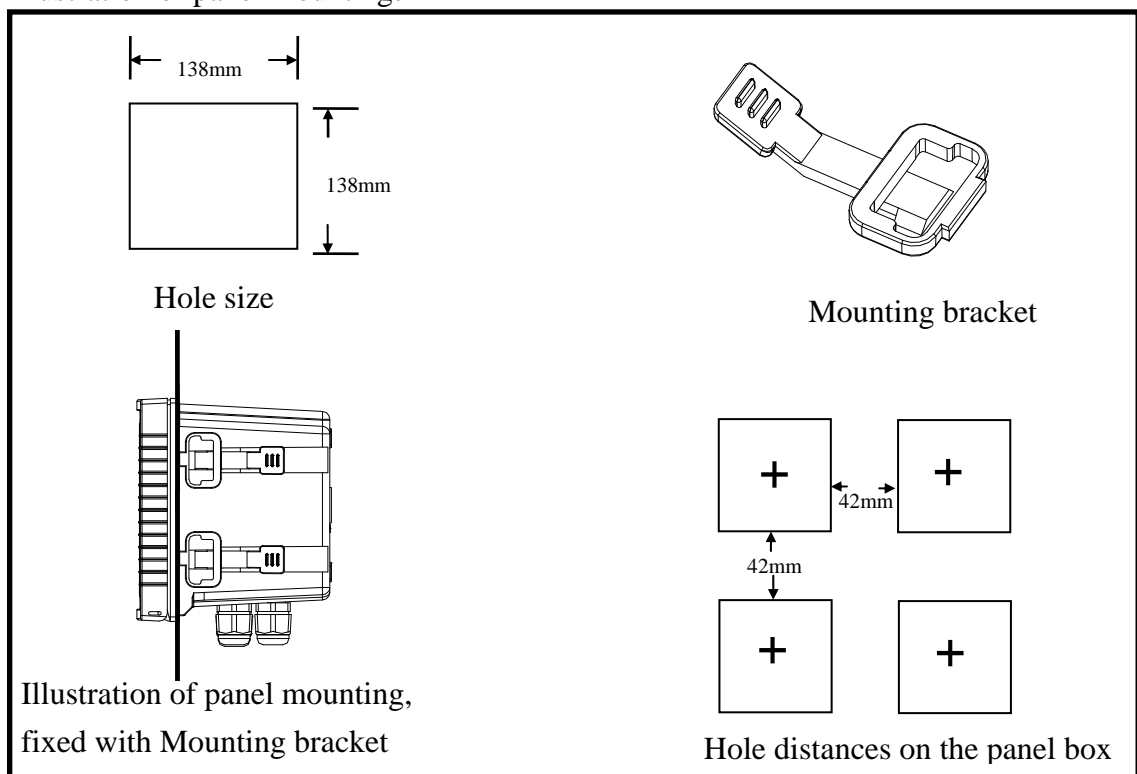
- Make sure to remove AC power from the transmitter before wiring input, output connections, and remove it before opening the transmitter housing.
- The installation site of the transmitter should be good in ventilation and avoid direct sunshine.
- The material of signal cable should be special coaxial cable. Strongly recommend using our coaxial cable. Do not use normal wires instead.
- Avoid electrical surge when using power. Especially when using three-phase power, use ground wire correctly.
- **The internal relay contact of the instruments is for alarm or control function. Due to safety, please must connect to external relay which can stand enough ampere to make sure the safety operation of the instruments. (Please refer to chapter 4.5“Illustration of electrical connection”)**

3. Assembly and installation

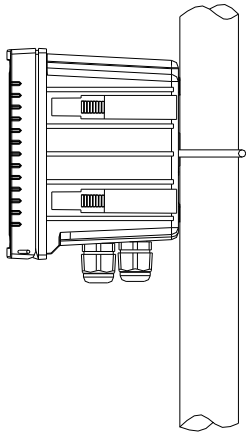
3.1 Transmitter installation: This transmitter can be installed through panel mounting, wall mounting and pipe mounting.

Installation of panel mounting: First, prepare a square hole of 138 x 138mm on the panel box, and then insert the transmitter directly into the panel box. Insert the accessorial mounting bracket from the rear, and make it be fixed in to pickup groove.

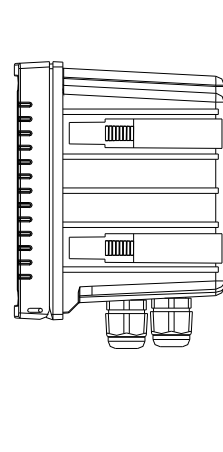
3.2 Illustration of panel mounting:



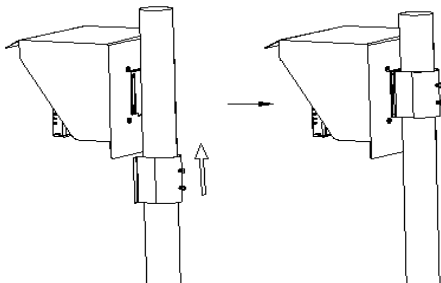
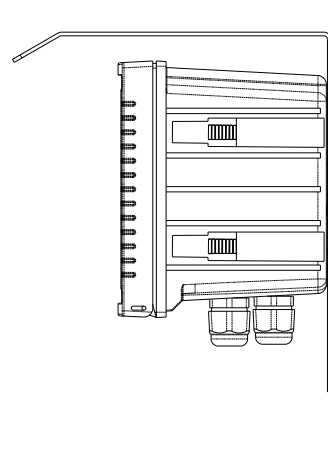
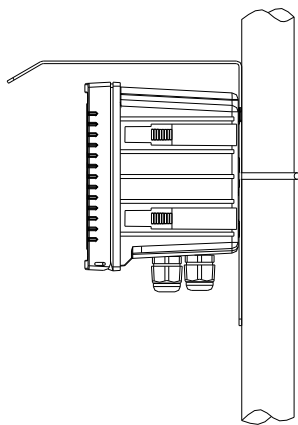
3.3 Illustration of Wall mounting and pipe mounting



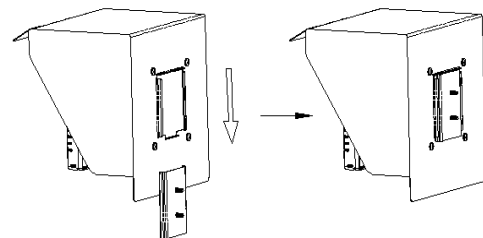
Installation of pipe mounting
Fixed with U-shaped pipe clip
Order No.: 8-34



Installation of wall mounting
Fixed with 4 x M5 screws



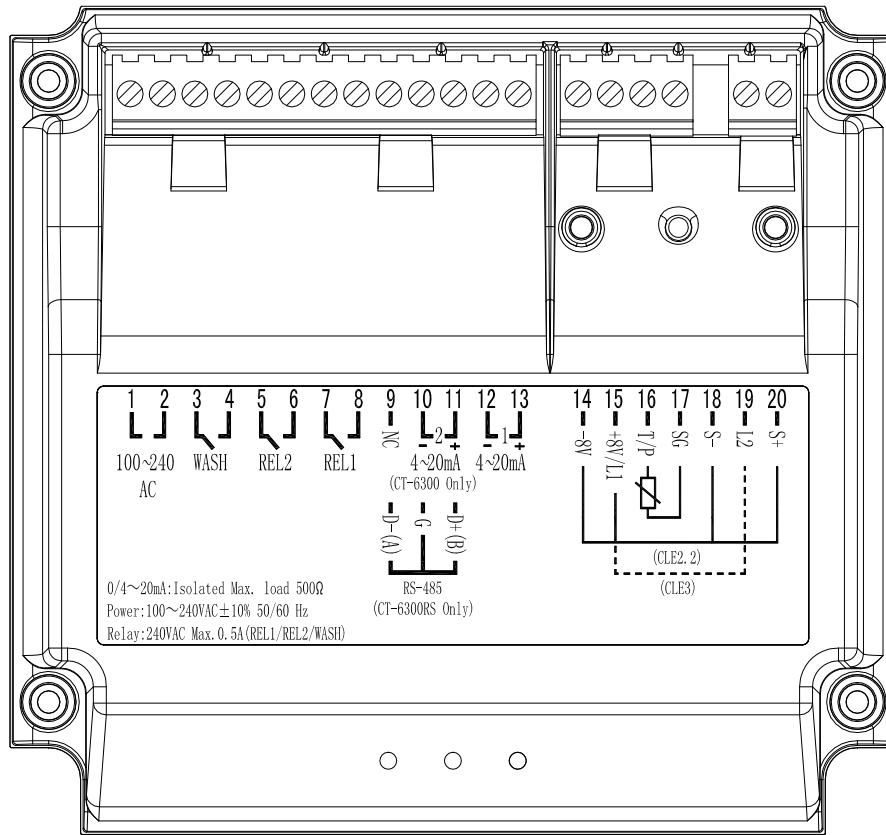
Sun Shield (Pipe mounting)
Order No.: 8-35 and 8-35-1



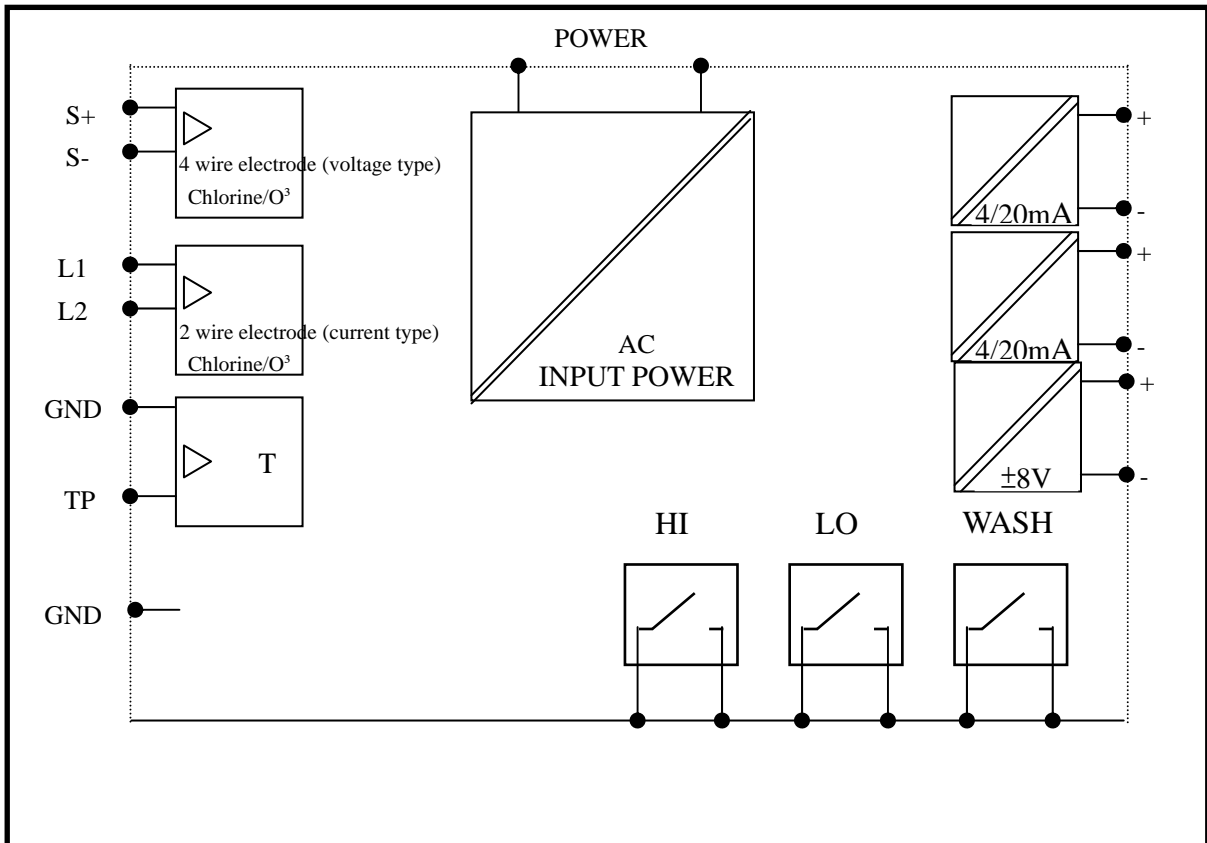
Sun Shield (Wall mounting)
Order No.: 8-35 and 8-35-2

4. Overview of residual chlorine/ozone transmitter CT-6300RS





















4.1 Illustration of rear panel



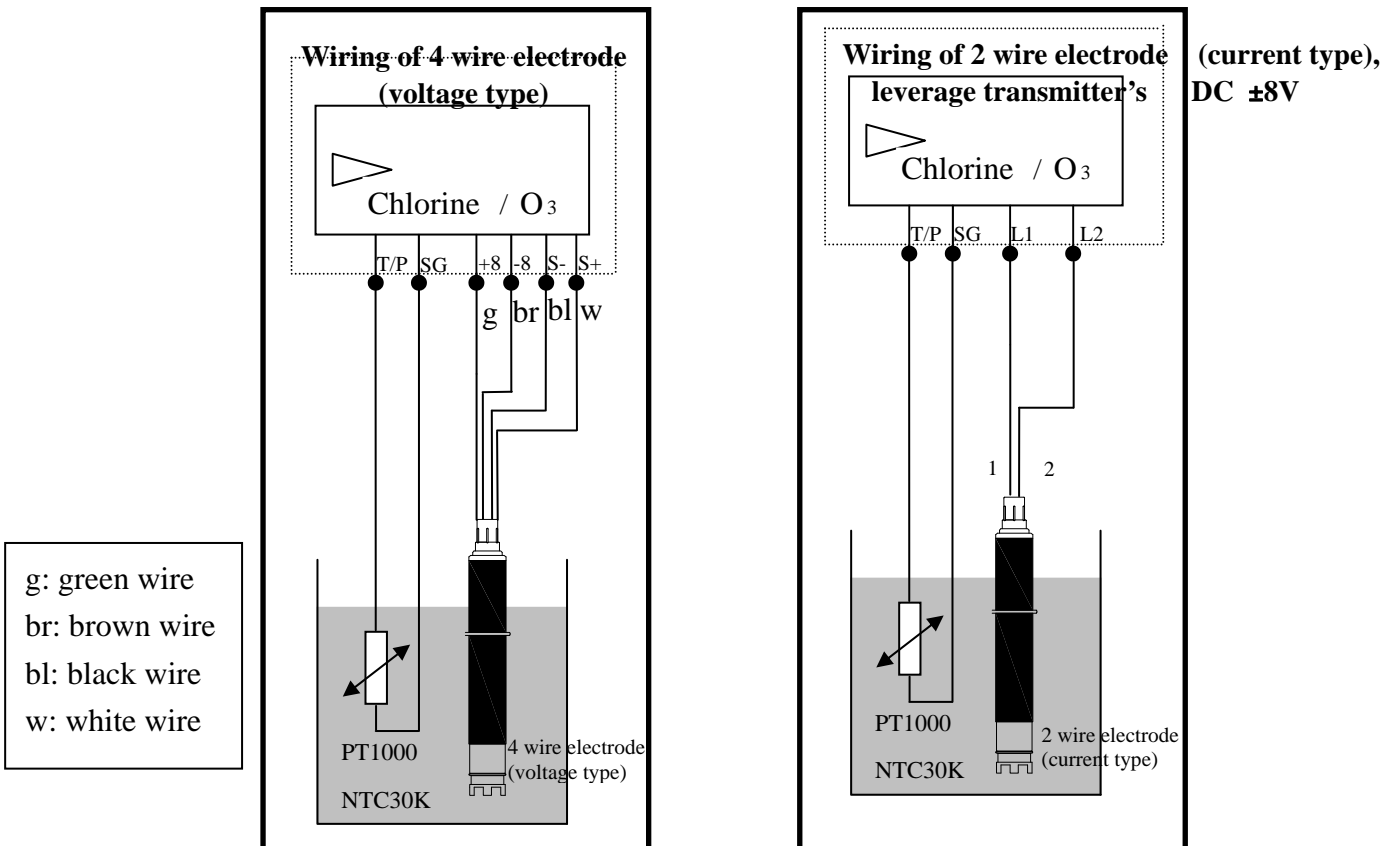
4.2 Illustration of terminal function



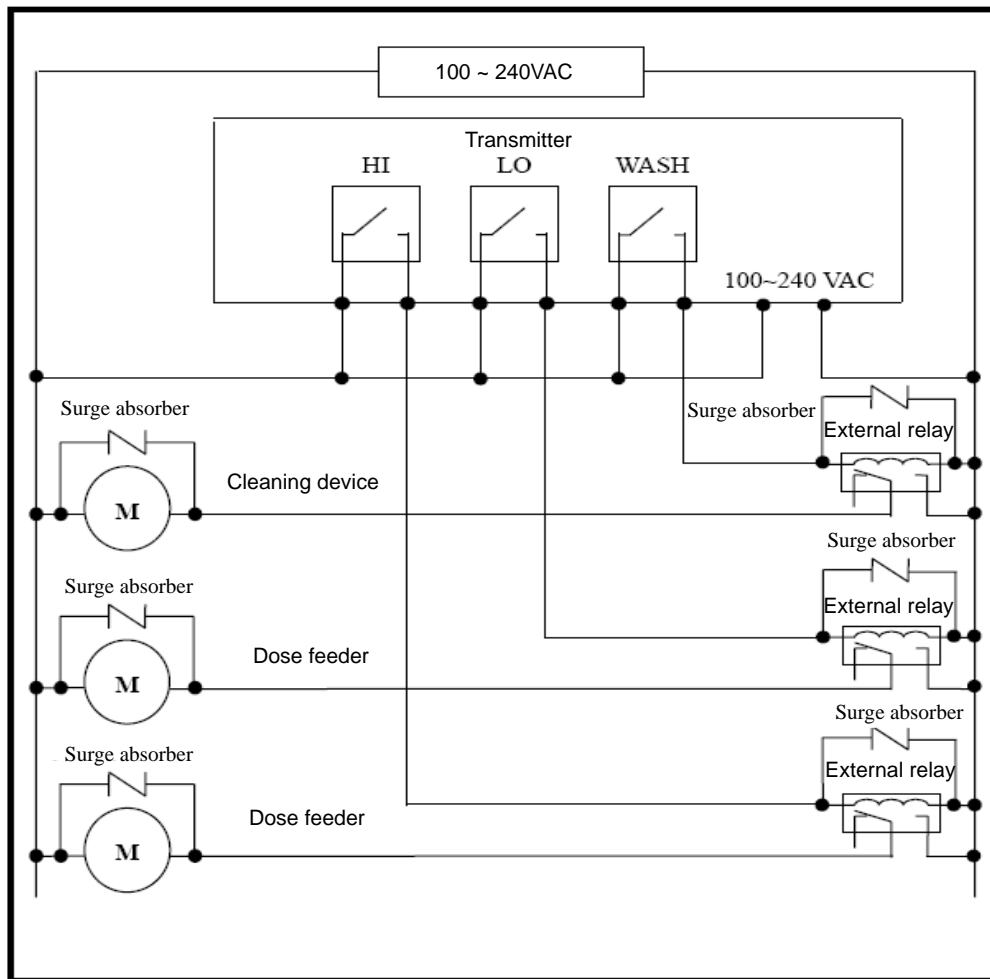
4.3 Description of terminal function

- 1  AC100~240V: Power supply terminal
- 2  AC100~240V: Power supply terminal
- 3  WASH: External wash relay terminal
- 4  WASH: External wash relay terminal
- 5  REL2: External relay terminal Low Point control
- 6  REL2: External relay terminal Low Point control
- 7  REL1: External relay terminal High Point control
- 8  REL1: External relay terminal High Point control
- 9  RS-485 output: D-(A)
- 10  RS-485 output: GND
- 11  RS-485 output: D+(B)
- 12  4~20mA : Master measurement current output terminal, for external recorder or PLC control
- 13  4~20mA : Master measurement current output terminal, for external recorder or PLC control
- 14  DC-8V : Connect to voltage type electrode (CLE2.2) terminal V - (brown wire)
- 15  DC+8V/ L1 : Connect to a voltage type electrode (CLE2.2)terminal V + (green wire), or connect to a current type electrode(CLE3, or OZE3) terminal 1.
- 16  T/P: Connect to earth end of temperature probe
- 17  T/P: Connect to earth end of temperature probe
- 18  S-: Connect to black signal wire of the voltage type of electrode (CLE2.2)
- 19  L2: Connect to terminal 2 of the current type electrode (CLE3, or OZE3)
- 20  S+: Connect to white signal wire of the voltage type of electrode (CLE2.2)

4.4 Illustration of cable wiring

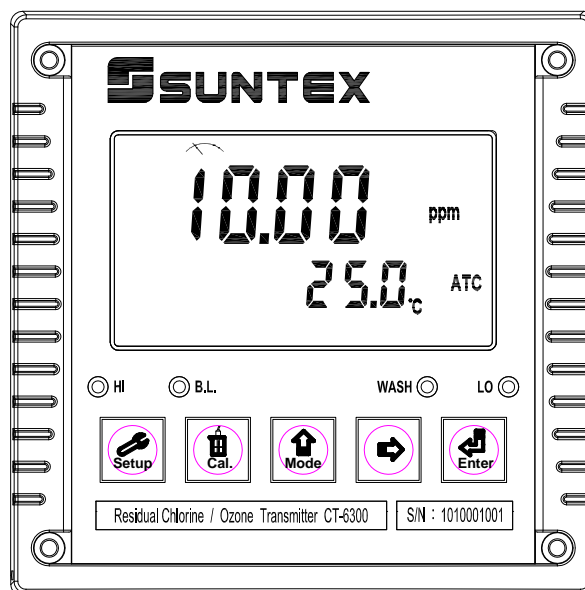


4.5 Illustration of electrical connection:



5. Configuration:

5.1 Illustration of front panel:



5.2 Keypad:

In order to prevent inappropriate operation by others, before the parameter setting and calibration, the operation applies multi-keys, and coding protection if necessary. Description of the key functions is in the following:



In the parameter set-up mode, pressing this key allows you exit parameter set-up mode and back to Measurement mode.



In the Calibration mode, pressing this key allows you exit Calibration mode and back to Measurement mode.



In the parameter set-up mode and Calibration mode, pressing this key to increase the value or to scroll to other function.



In the parameter set-up mode and Calibration mode, pressing this key to decrease the value or to scroll to other function.



Key for confirmation; pressing this key is essential when modifying data value or selecting the parameter setting items in the window.



+



: In the Measurement mode, pressing these two keys simultaneously allows you enter Calibration mode.






+






: In the Measurement mode, pressing these two keys simultaneously allows you enter parameter set-up mode.

(Master Reset) Restore factory default parameter's settings

In the Measurement mode, press the two keys  +  simultaneously for five seconds, and then press  until you see a clock signal appearing on the display; then loose all keys to restore factory default settings.

(Calibration Reset) Restore factory default calibration's settings

In the Measurement mode, press the two keys  +  simultaneously for five seconds, and then press  until you see a clock signal appearing on the display; then loose all keys to restore factory default calibrations.

5.3 LED indicators:

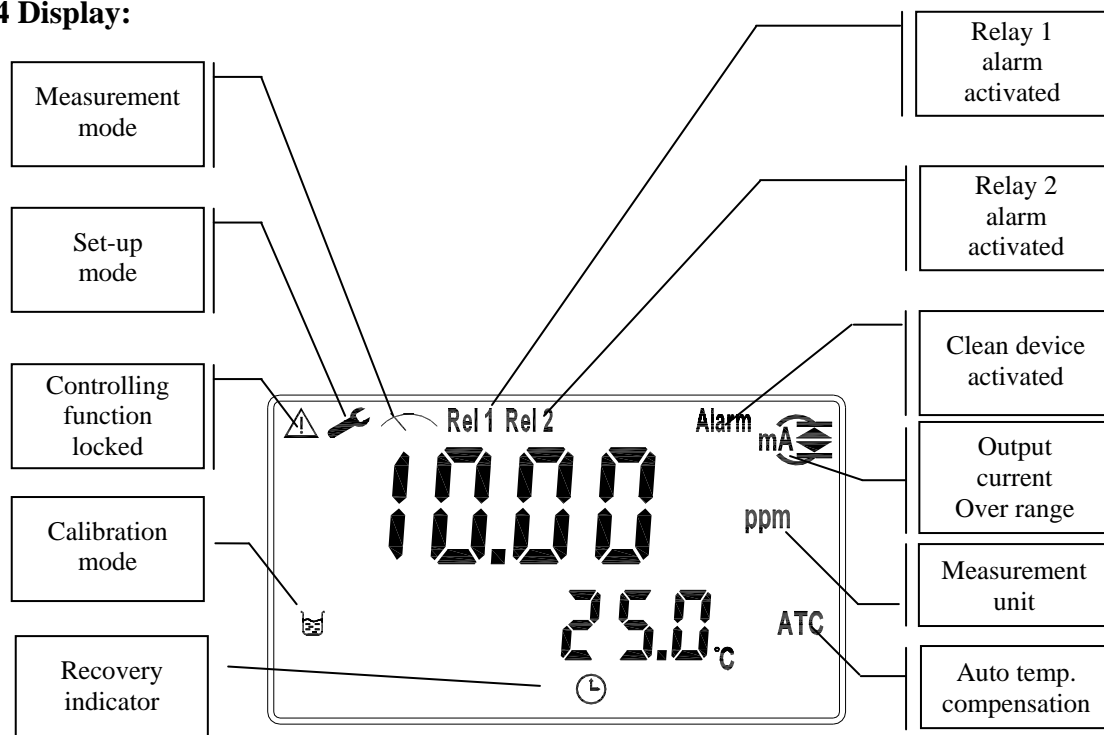
WASH: Washing device operation indicator lamp; when the washing device is started up, the Alarm indicator will light.


HI : Controlling operation indicator lamp; when the high setting point is reached, the REL1 indicator will light.


LO : Controlling operation indicator lamp; when the low setting point is started up, the REL2 indicator will light.

B.L. : Light sensor; in the automatic display backlit mode, the lamp will light or go out as the change of environmental brightness.

5.4 Display:



 : Measurement is over-range than the setting which is corresponding to output 20mA


 : Measurement is over-range than the setting which is corresponding to output 0/4mA

6. Operation


6.1 Measurement mode:

After all electrical connections are finished and tested, connect the instrument to the power supply and turn it on. The transmitter will automatically entering measurement mode with the factory default settings or the last settings from user.

6.2 Set-up mode:

Please refer to the set-up instructions in Chapter 7, and press  to back to measurement mode.

6.3 Calibration mode:

Please refer to the calibration instruction in chapter 8, and press  to back to measurement mode.

6.4 Reset:

Factory default value:

Measurement mode: CLE2, 20.00 ppm

Temperature compensation: MTC

Auto return: AUTO

Relay 1(High point alarm):AUTO , SP1= 10.00 ppm , db1= 0.10 ppm

Relay 2(Low point alarm):AUTO , SP2= 1.00 ppm , db2= 0.10 ppm

Wash time: OFF (ON.S=0S , OFF.H=0.OH , DB.S=10S)

Analog output4~20 mA , 0.0~20.00 ppm

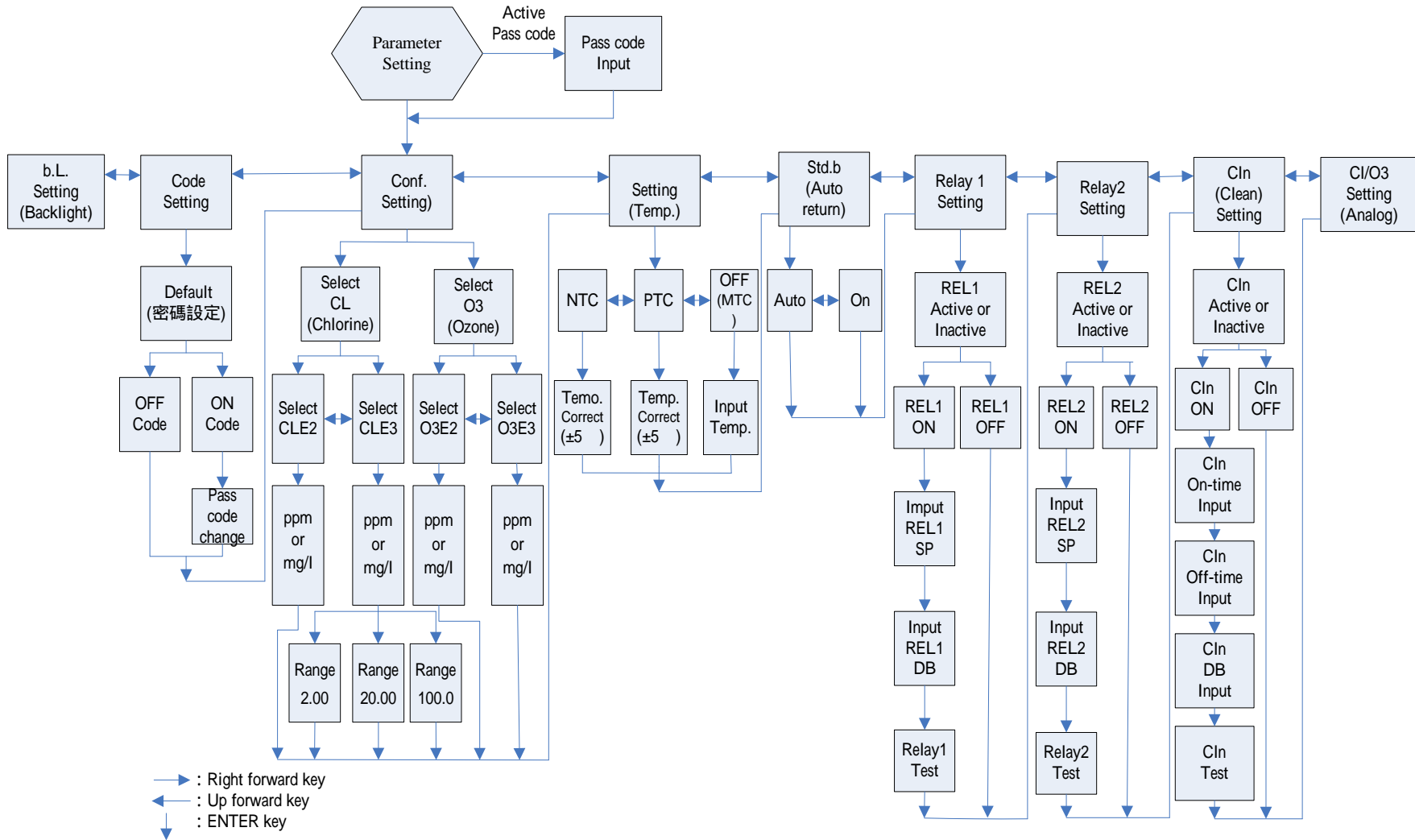
Date & Time: 2010/1/1, 00:00:00

RS-485: RTU , Even , 19200 , ID:01

Code: OFF

7. Settings

Block diagram of settings 1:



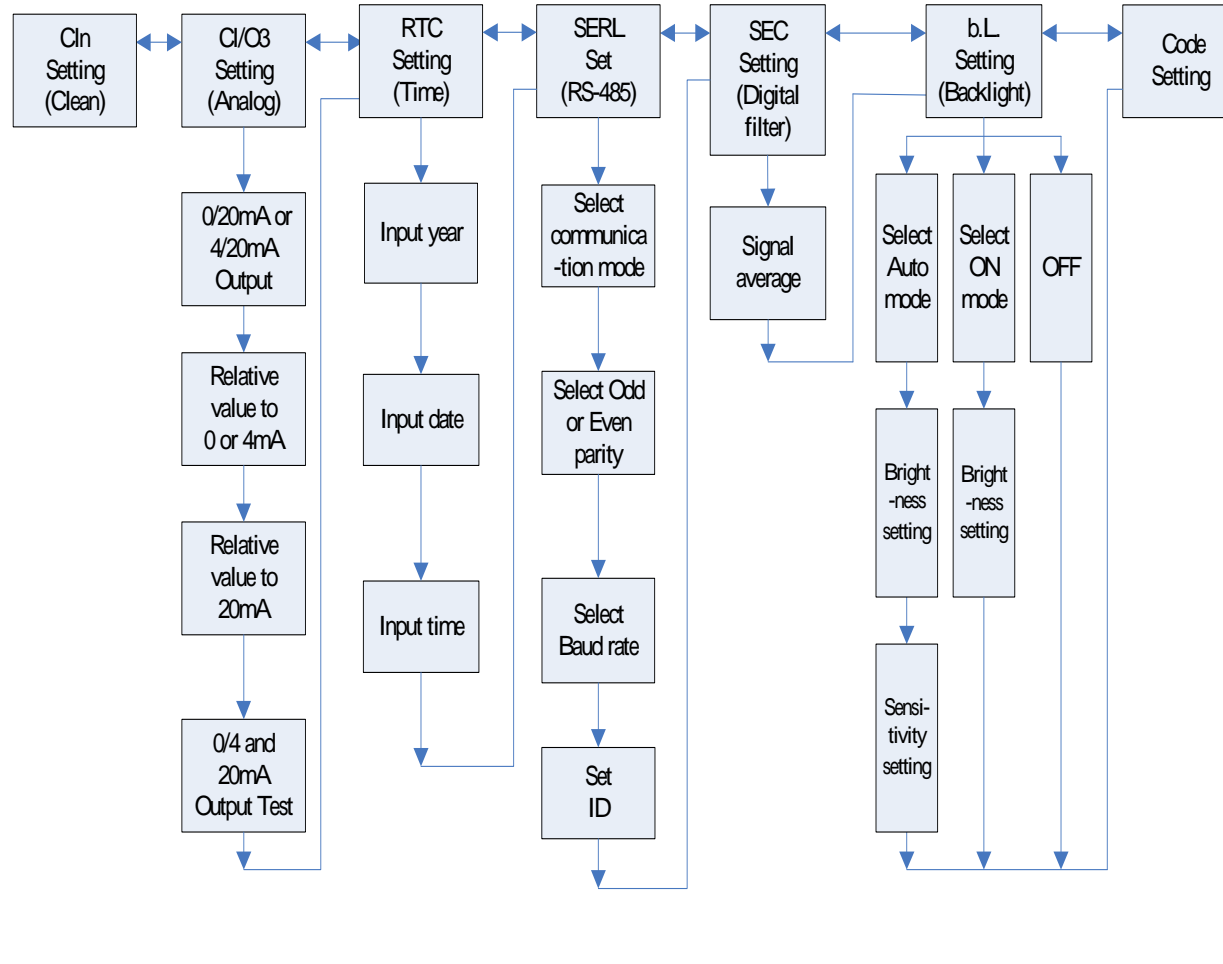
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Block diagram of settings 2:

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Connected with previous page

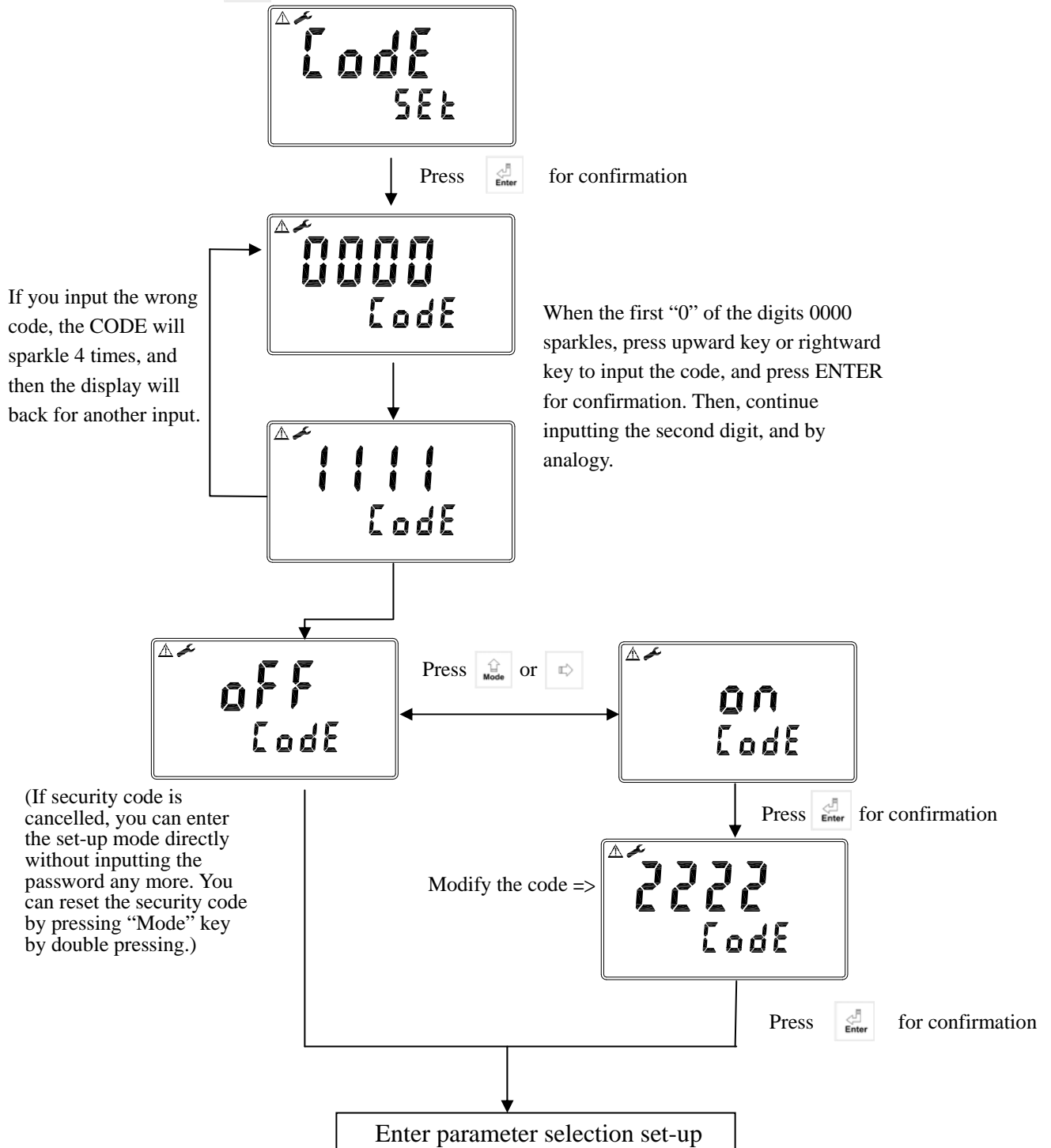


7.1 Entry of set-up mode

In the measurement mode, pressing the two keys  +  simultaneously allows you enter the parameter set-up mode. You can back to the measurement mode at any time by pressing the key . The original code is 1111.

7.2 Security code of settings

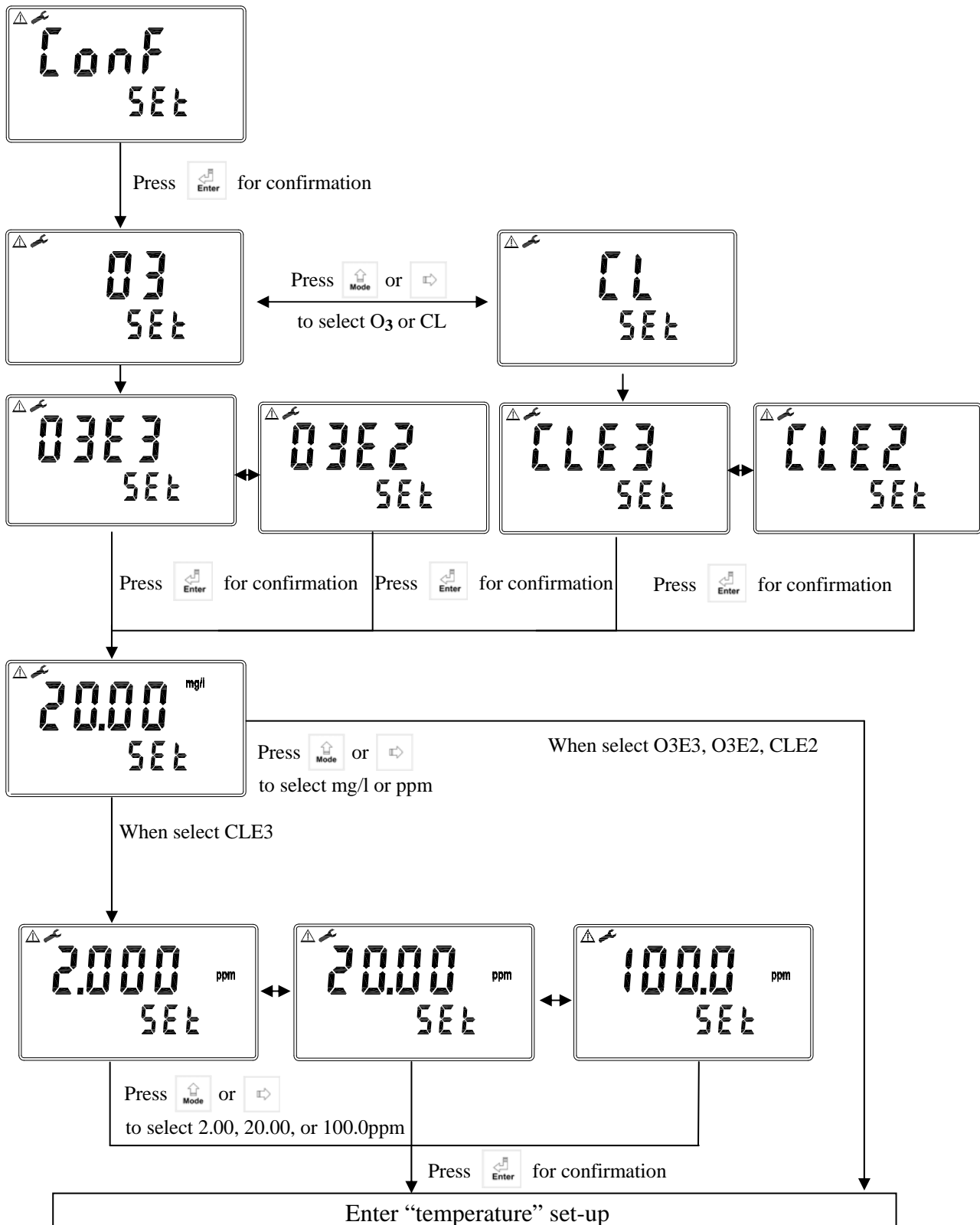
In the set-up mode, you can set up the code by pressing the key , and confirm by pressing the key .



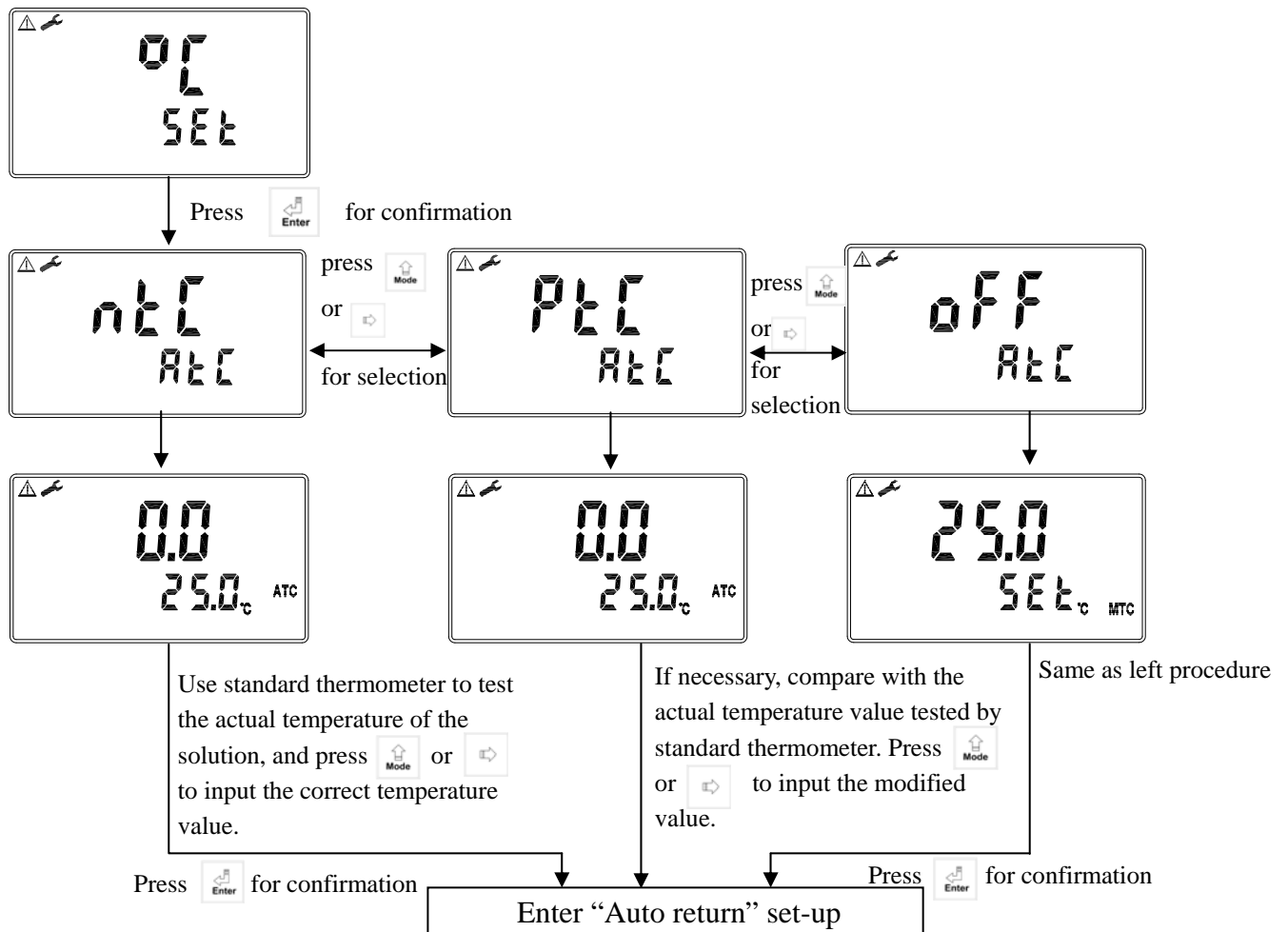
7.3 Measurement parameter set-up

Please select "CL" for residual chlorine measurement. Then, please select "CLE2" for 4-wire (voltage type) electrode; select "CLE3" for 2-wire(current type) electrode. Then, according to sensor model, select measuring limit "2.00ppm", "20.00ppm", or "100.0ppm."

Please select "O₃" for ozone measurement. Then, please select "O3E2" for 4-wire (voltage type) electrode; or select "O3E3" for 2-wire(current type) electrode.

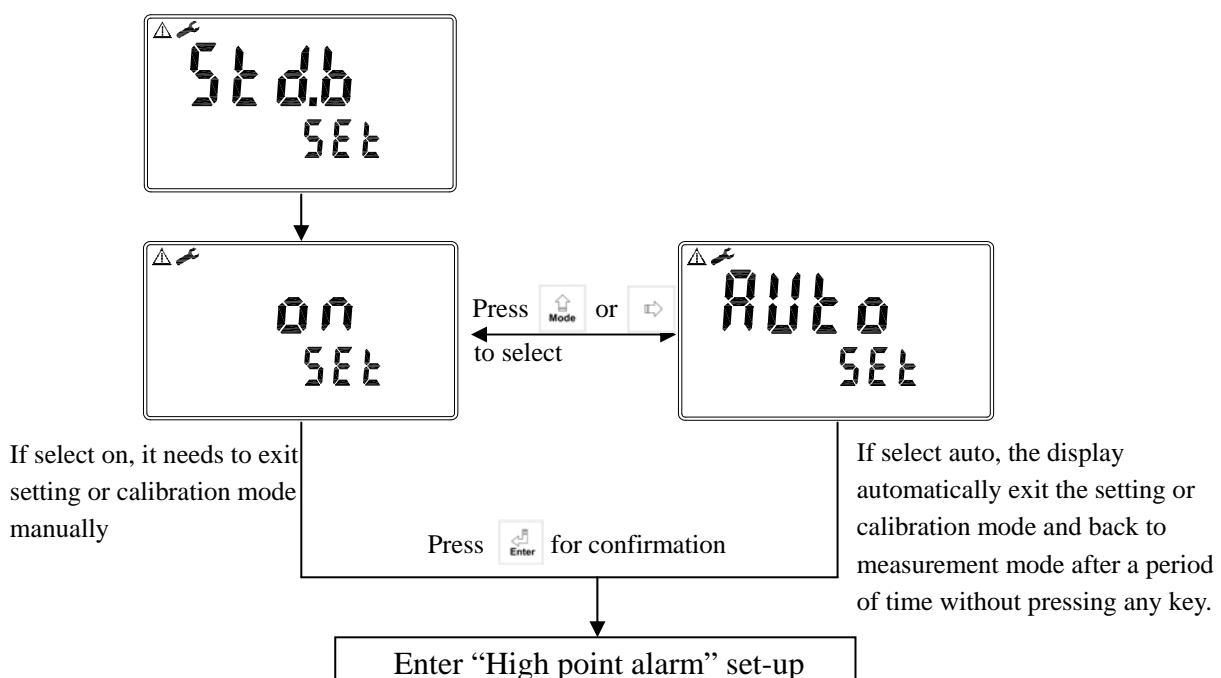


7.4 Temperature parameter



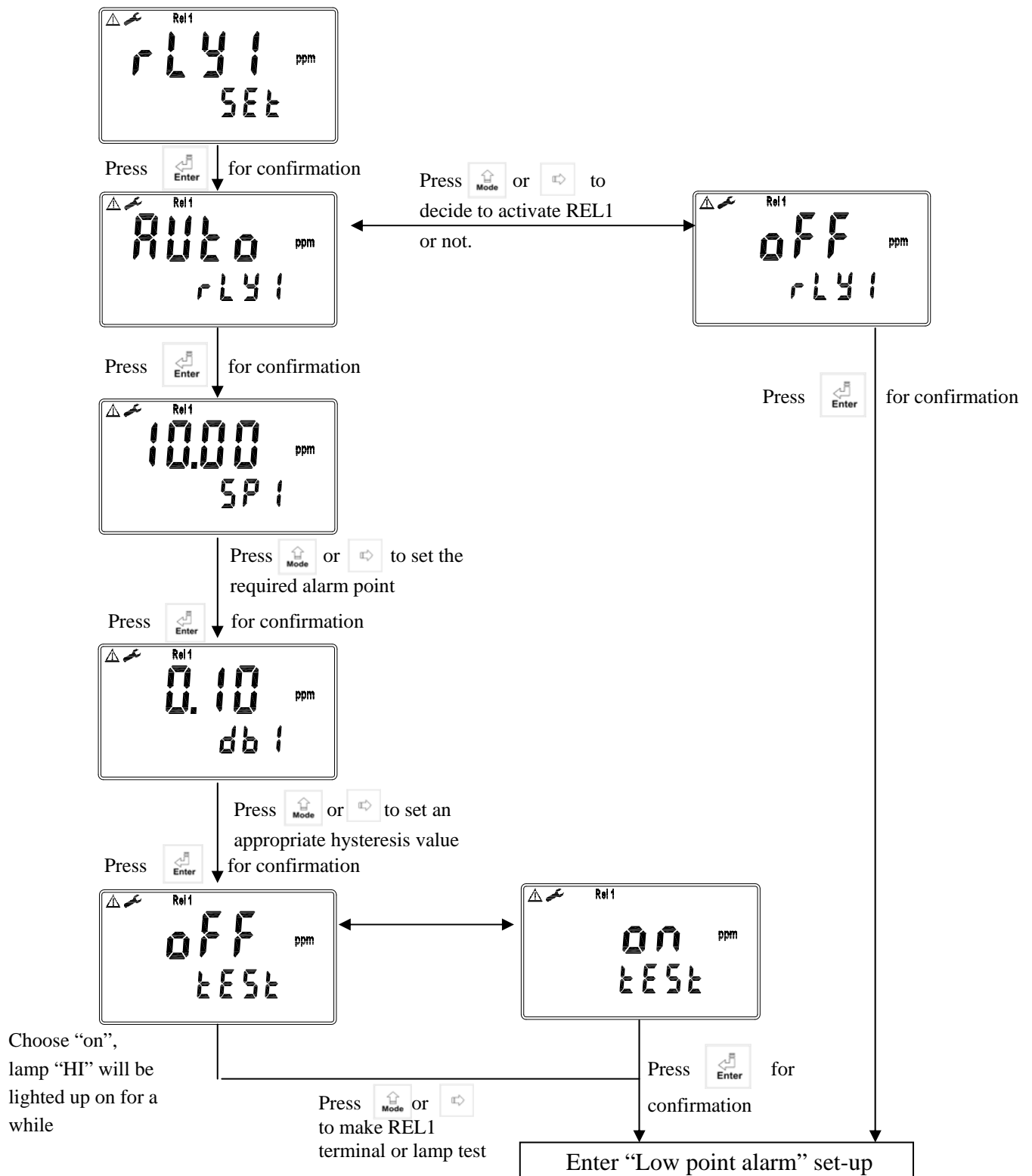
7.5 Auto return set-up

Enter setup of auto return mode (Return) to set the function that the instrument automatically exit the setup menu after a period of time without pressing any key.



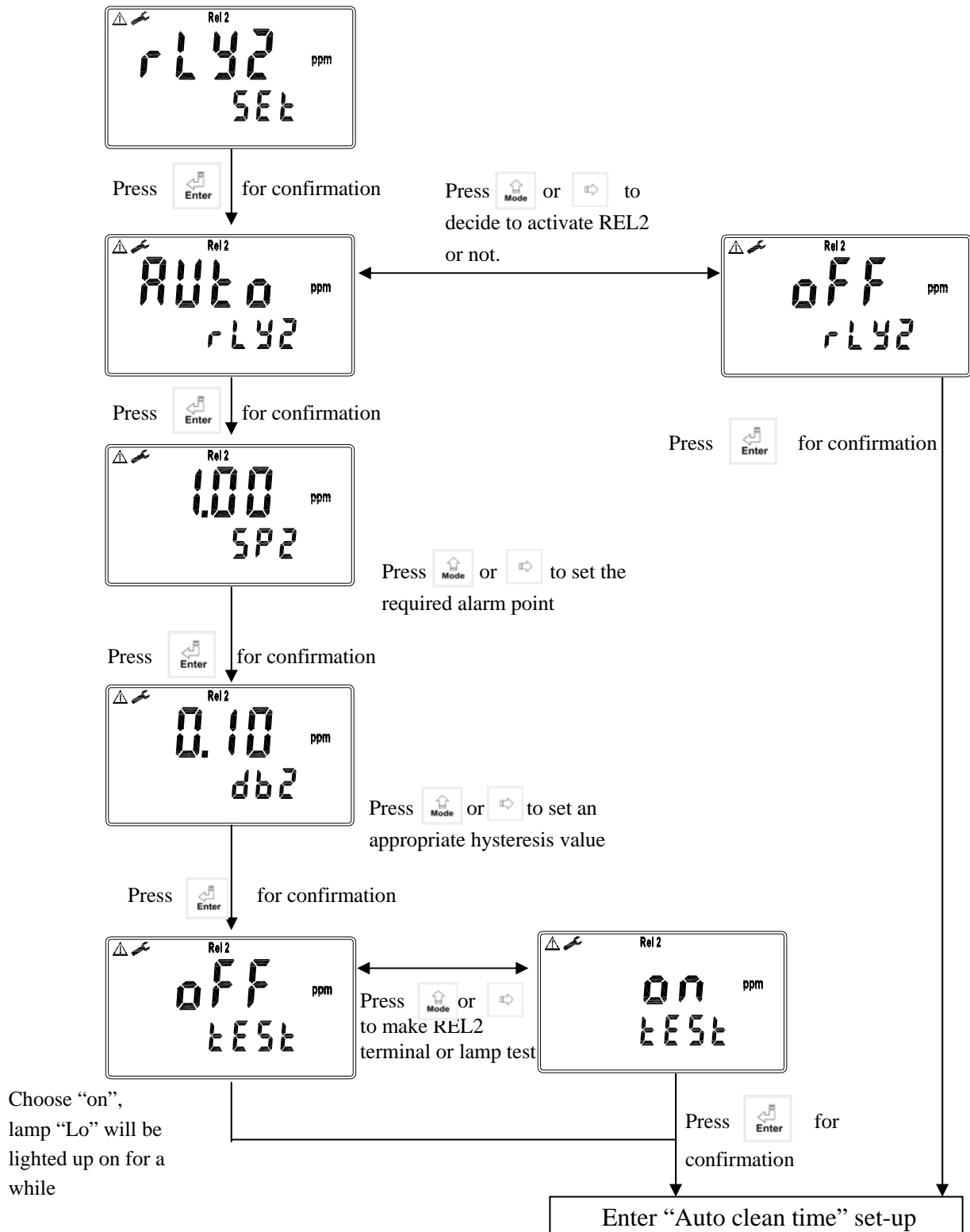
7.6 Hi point

Set the TH (THRESHOLD) and DB (DEADBAND) of Hi (REL1). The range for TH is 0.00~20.00ppm(mg/l); while the range for DB is 0.00~3.00ppm(mg/l).



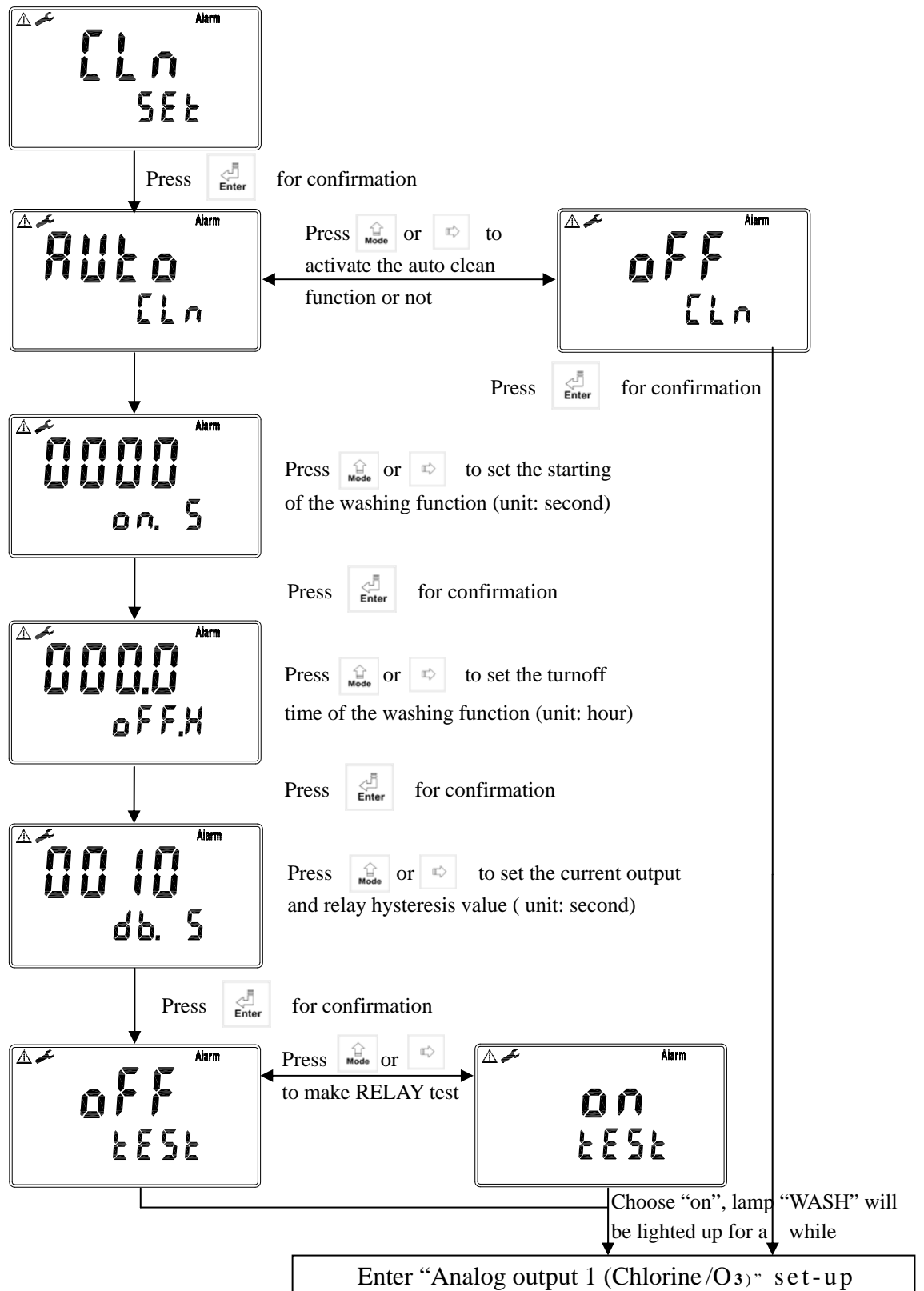
7.7 Lo point

Set the TH (THRESHOLD) and DB (DEADBAND) of Lo (REL2). The range for TH is 0.00~20.00ppm(mg/l); while the range for DB is 0.00~3.00ppm(mg/l).



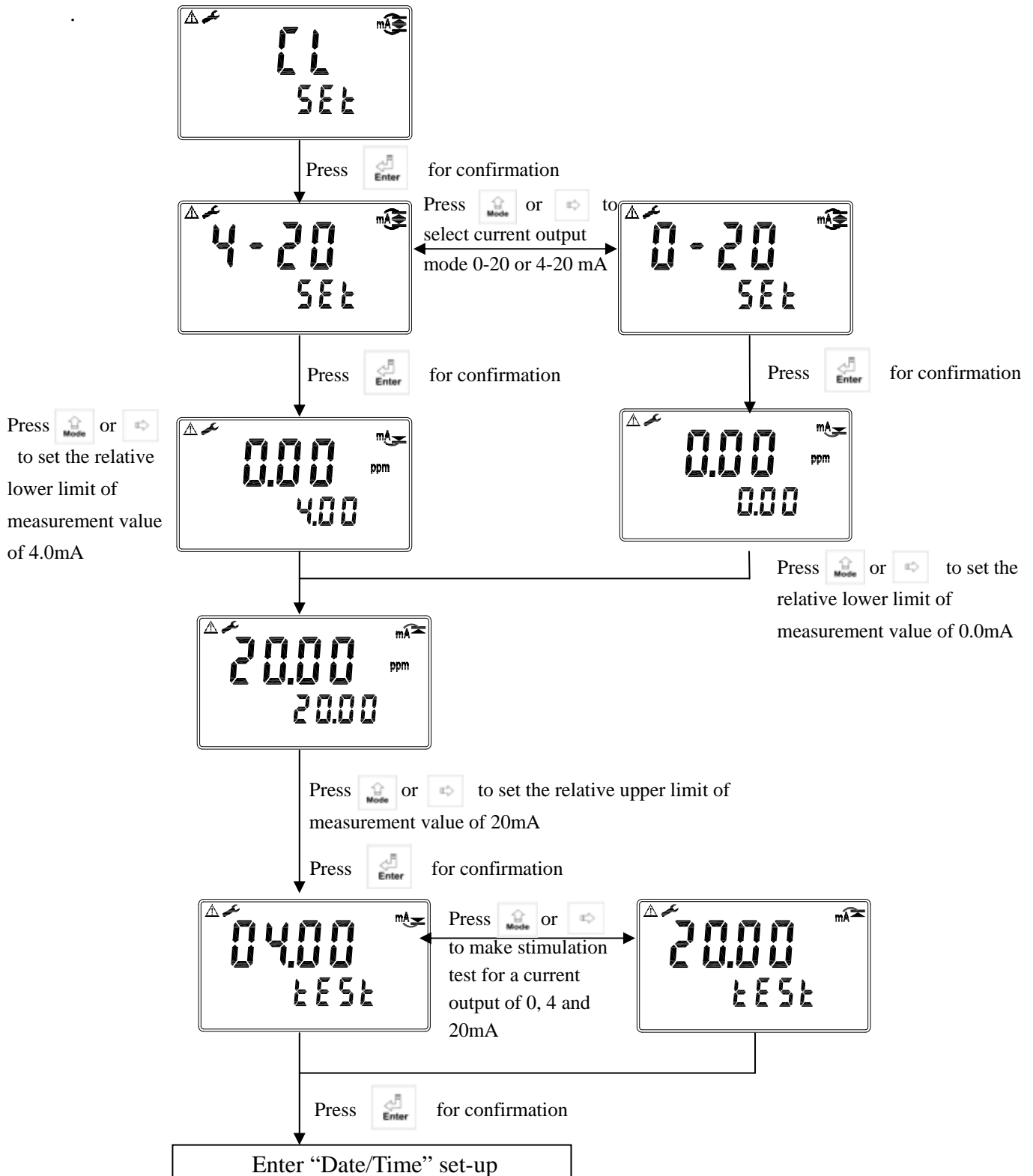
7.8 Wash time

Set the automatic starting time and turn-off time of the washing function. If any value is set to be 0, the instrument will automatically stop this function.



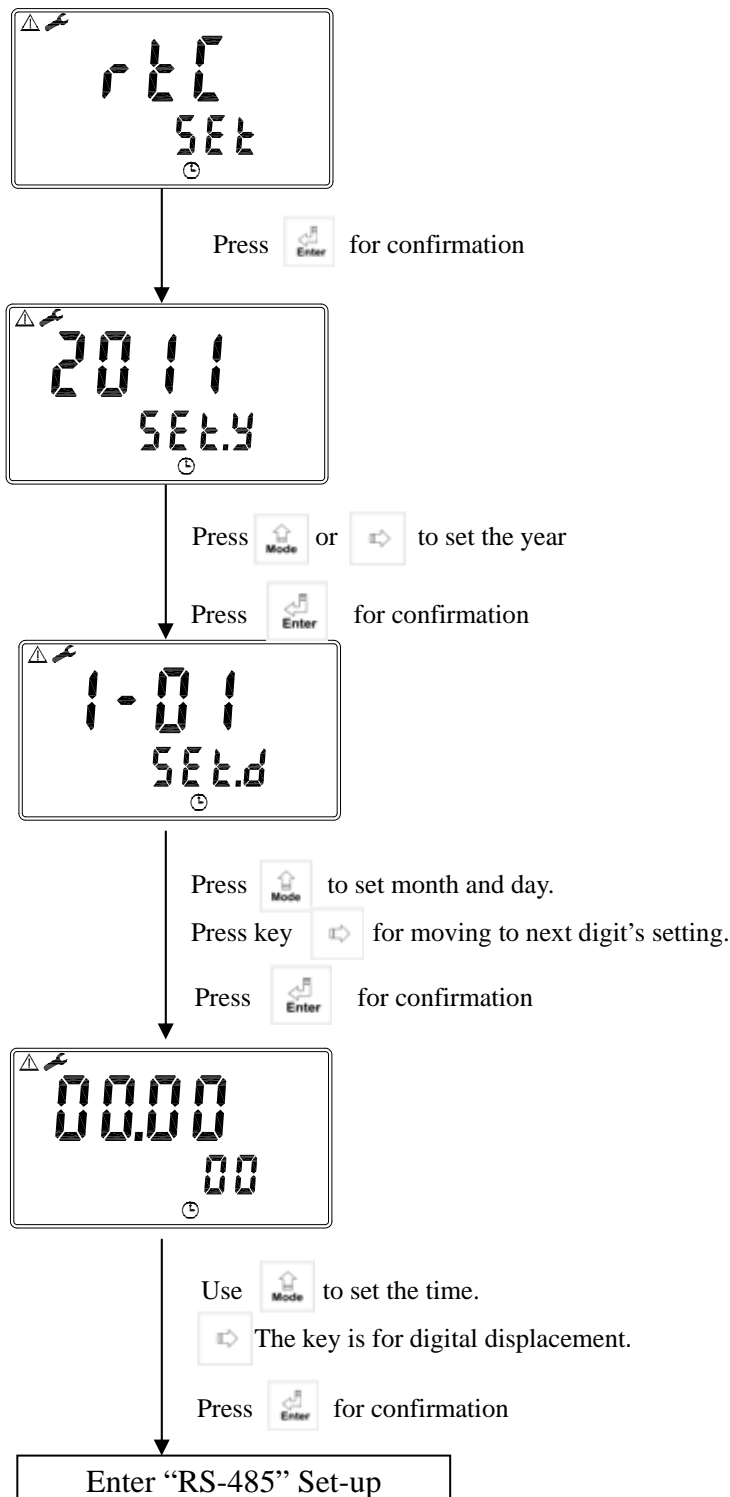
7.9 Analog output 1(Chlorine /O₃)

The user can adjust the relative relationship between the Chlorine /O₃ measurement range and the output current according to actual situation, in order to improve the recognition of current output.



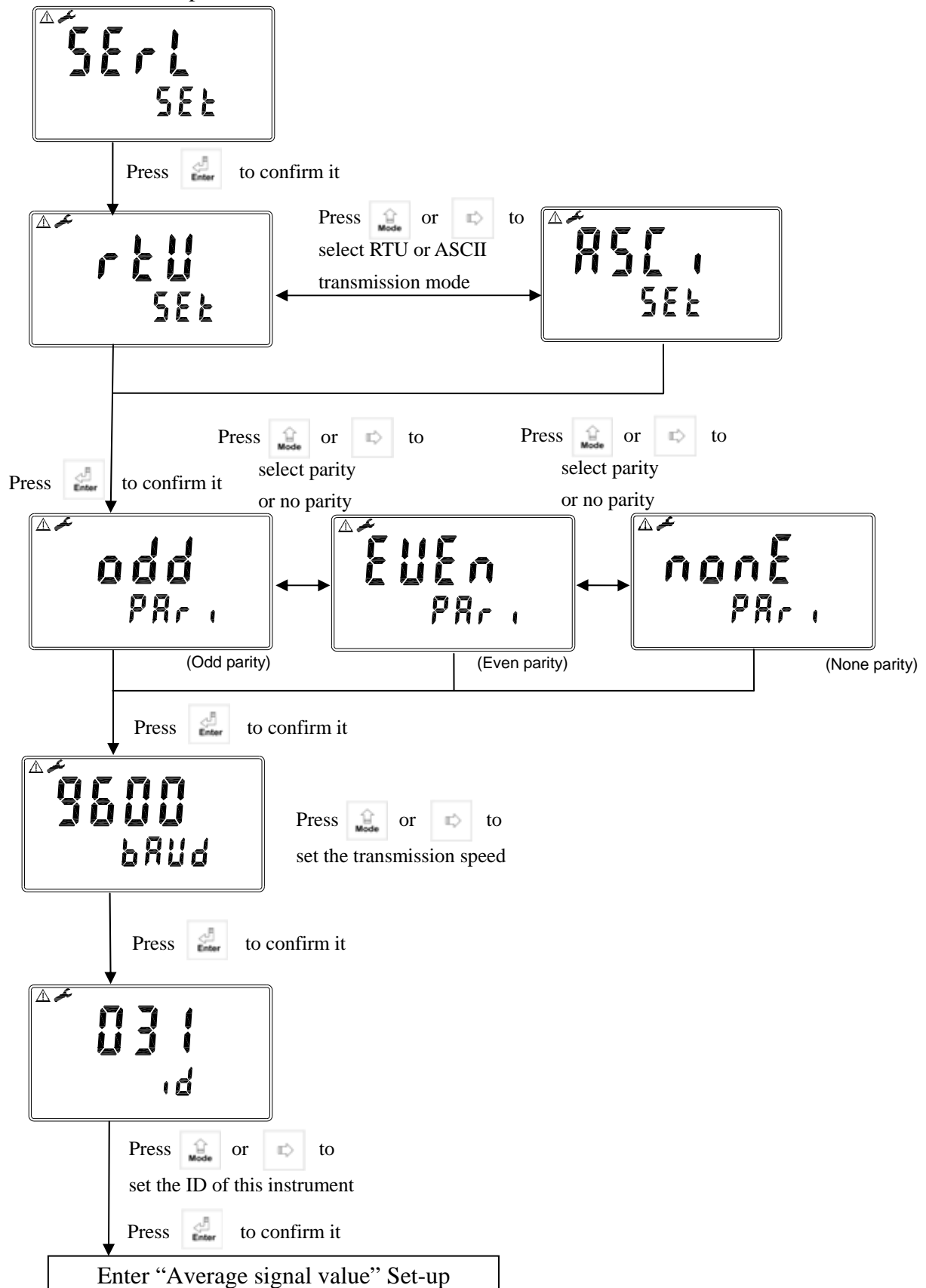
7.10 Date/time set-up

Enter setup of Date/Time(real time clock). Set the “Year”, “Month”, “Date”, “Hour”, and “Minute” time. The transmitter may keep the clock in operation even when encountering power failure. Only when the inner battery is out of power, the clock may stop operation. Then, please replace the 3V CR2025 Li battery inside the transmitter.



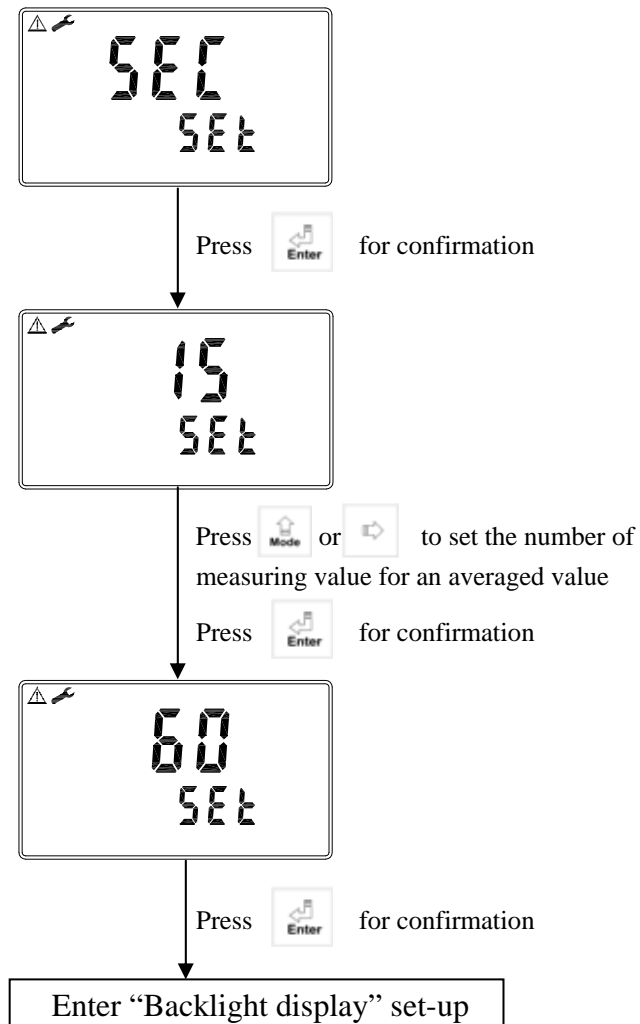
7.11 RS-485 set-up

Users may according to your need to freely set the ID and transmission speed of the serial output.

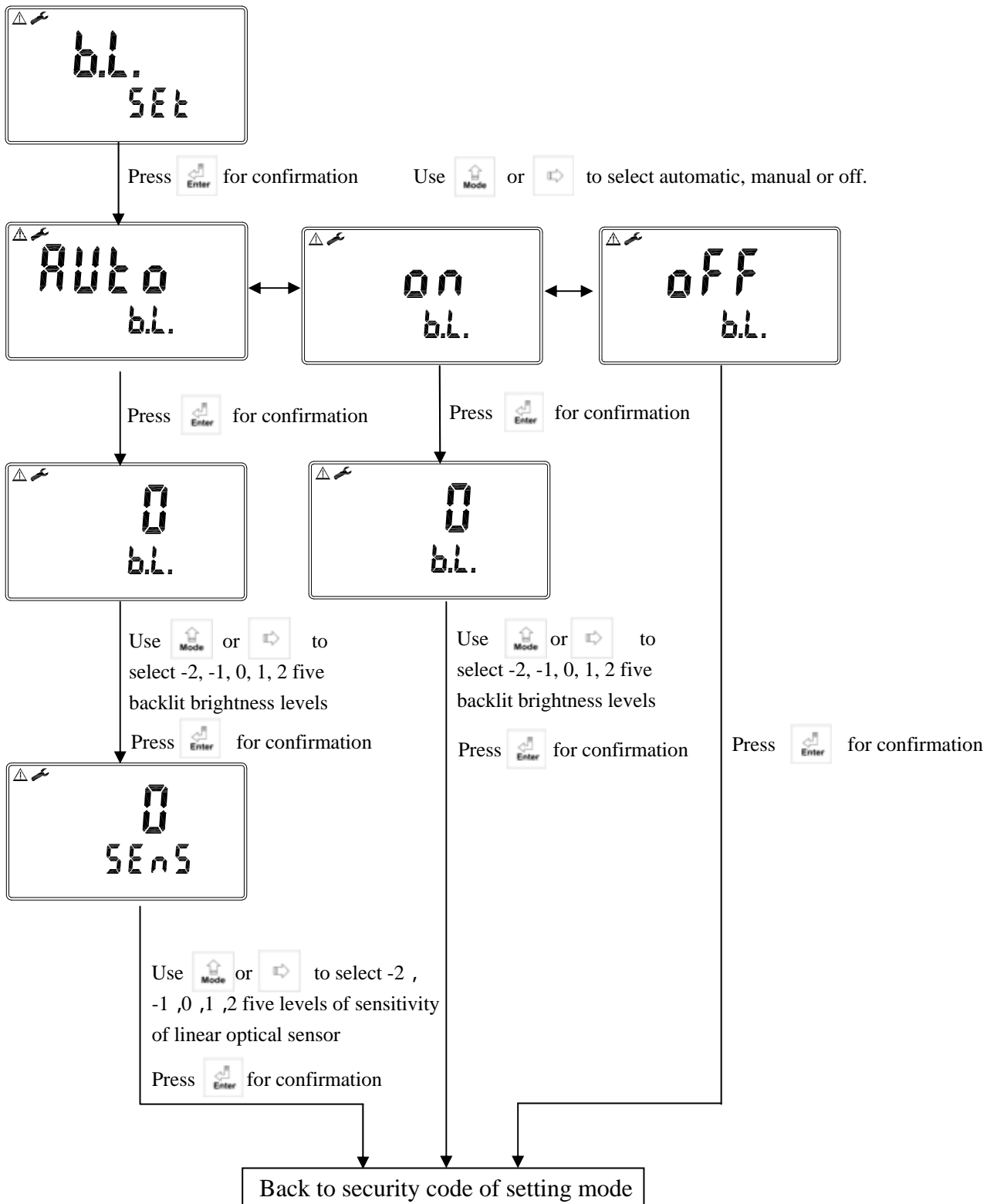


7.12 Average signal value set-up

You may set which number of measurement value to make an averaged value to increase the stability of display value.

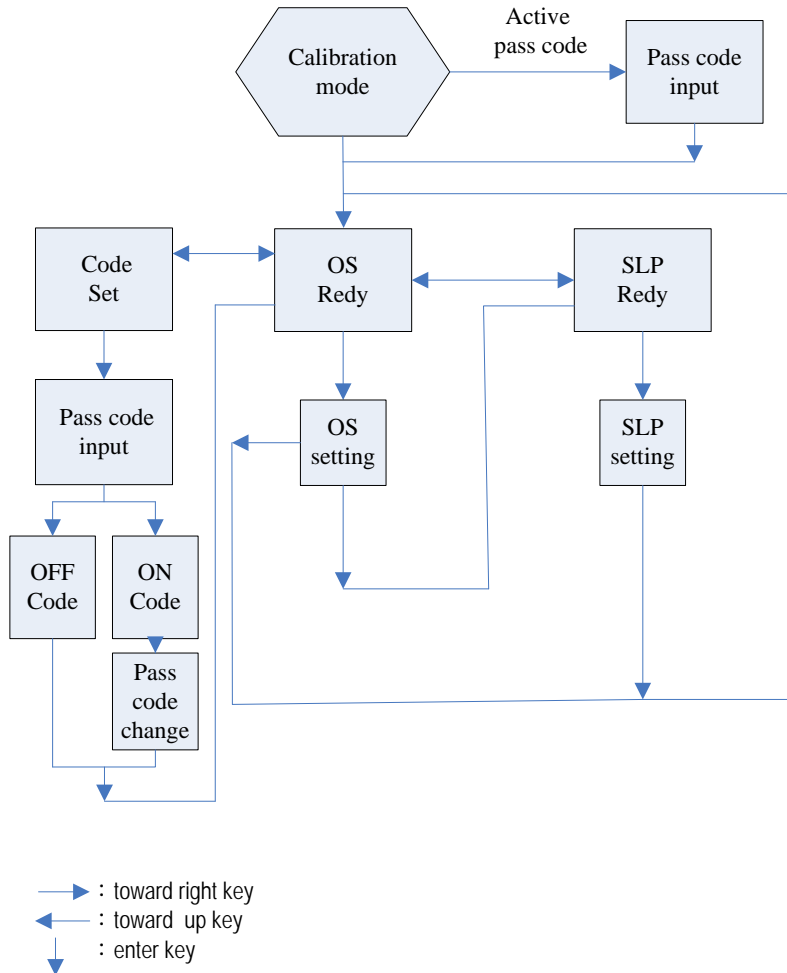


7.13 Backlight settings





8. Calibration

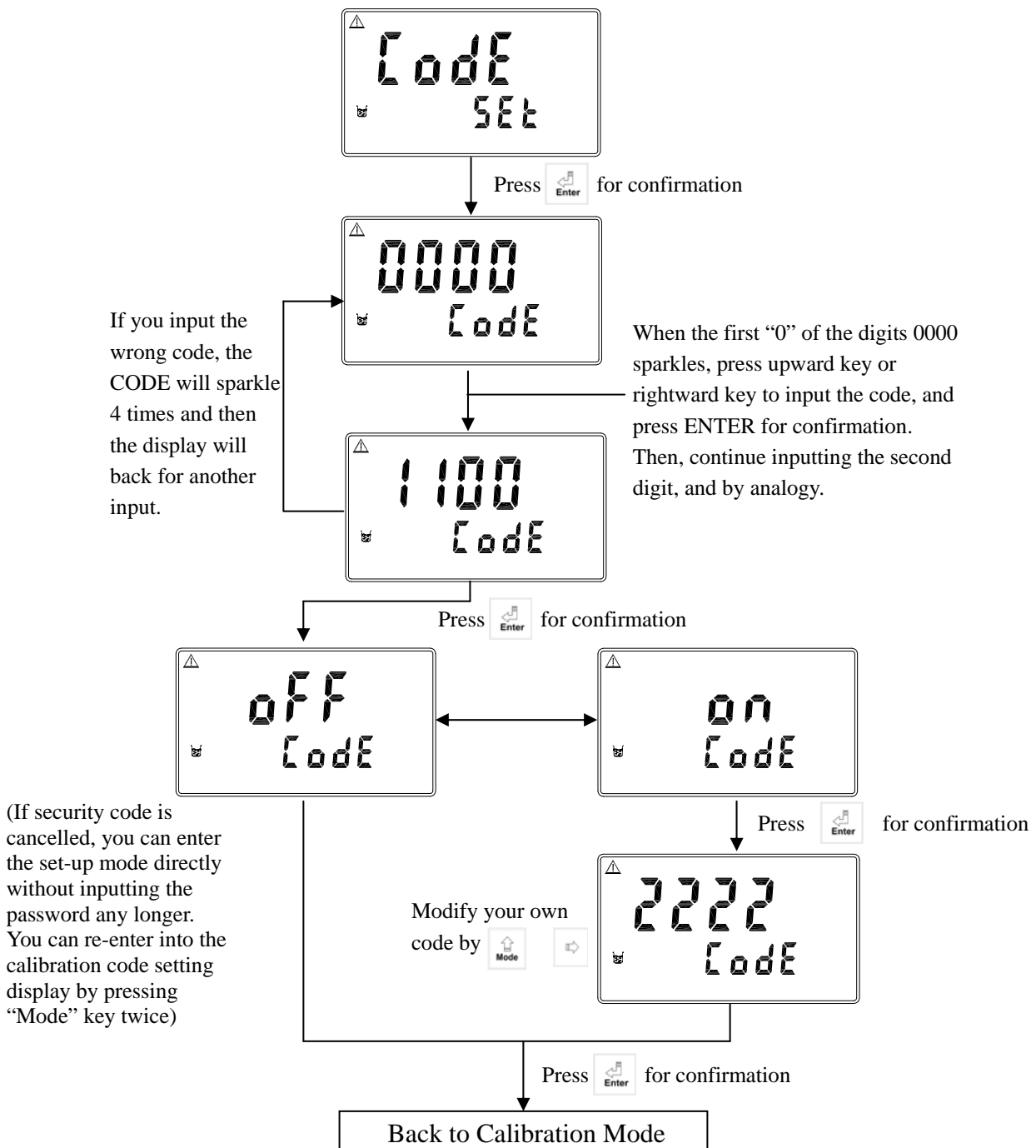
Block diagram of calibration



8.1 Security code of calibration

8.1.1 Code authorization: There is a two level password protection design. The authorization of settings password is prior to the authorization of calibration password. Therefore, you can unlock the calibration code with your “settings password” (security code of settings), or directly input with your calibration password (security code of calibration).












8.1.2 Code set: In the measurement mode, press  +  simultaneously to access calibration mode. The default security code of calibration is “1100”.

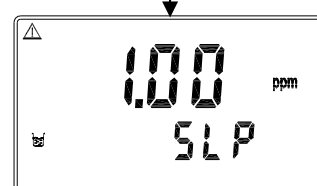
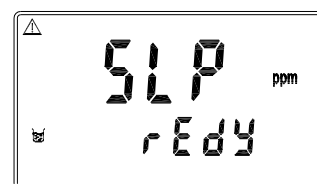
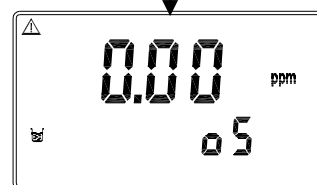
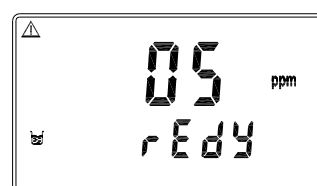


8.2 Calibration principle: You may decide if you need to make a zero-point(offset: “oS” in the display) calibration. If not, you may directly make a slope calibration (“SLP” in the display).







	OZONE (O ₃)	Residual chlorine(Cl)
Zero-point calibration	1. Not necessary (zero point accuracy of the sensor $\pm 0.05\text{ppm}$ 2. If in need, use distilled water or pure water which contains no ozone to clean it, and then drain out the water, make zero point calibration with the sensor in air.	1. Not necessary (zero point accuracy of the sensor $\pm 0.05\text{ppm}$ 2. If in need, use distilled water or pure water which contains no chlorine to clean it, and then drain out the water, make zero point calibration with the sensor in air.
Slope calibration	Use spectrophotometer with ozone reagent to make a measurement value bench mark, and compare it with the online measurement.	Use residual chlorine reagent (DPD-1) to make a measurement value bench mark, and compare it with the online measurement.


8.3 Current type sensor calibration mode (ex: Ozone sensor)





- Press  +  to enter into calibration mode. According to your need, press  or  to select zero-point (offset) (displayed as “oS”), press  to proceed step 3, or select “slope calibration”(displayed as “SLP”), and then press  to proceed step 4.
- Press  at any time under calibration mode to go back to measurement mode.
- When selecting zero-point (offset) calibration, please make zero-point calibration in air after cleaning the sensor with distilled or pure water which do not contain with chlorine. Wait for display value becoming stable, press  or  to adjust the value until it becomes 0.00. Then, press . After zero-point calibration, the procedure will automatically lead to slope calibration (displayed as “SLP”). If you do not need to make a slope calibration, press  to leave the calibration mode and back to measurement mode.
- When selecting slope calibration, put sensor into flow-through chamber, and make the sample go into the chamber at least 15 minutes until the display value becomes stable. Leverage spectrophotometer measurement as a bench mark value to compare and adjust with the online value.






8.4 Voltage type sensor calibration mode (ex: residual chlorine sensor)

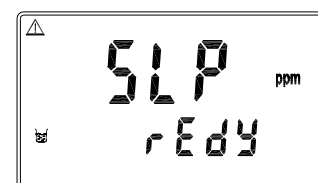
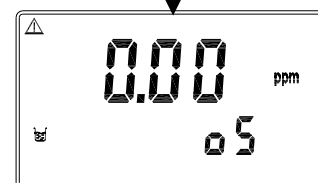
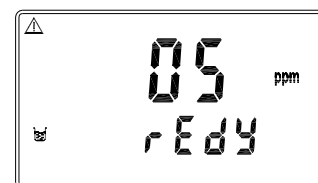
1. Press  +  to enter into calibration mode. According to your need, press  or  to select zero-point (offset) (displayed as “oS”), press  to proceed step 3, or select “slope calibration”(displayed as “SLP”), and then press  to proceed step 4.

2. Press  at any time under calibration mode to go back to measurement mode.

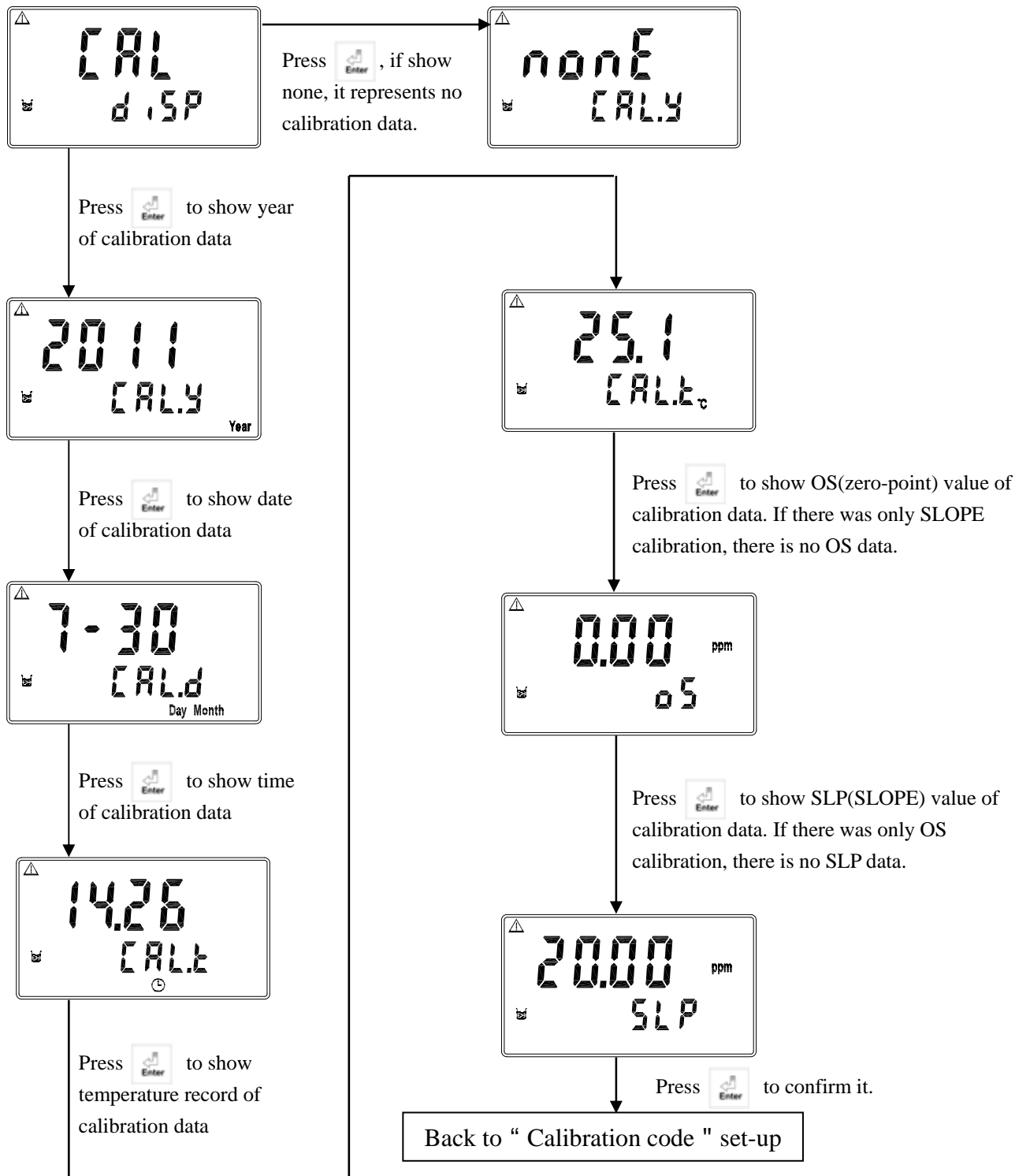
3. When selecting zero-point (offset) calibration, please make zero-point calibration in air after cleaning the sensor with distilled or pure water which do not contain with chlorine. Wait for display value becoming stable, press  or  to adjust the value until it becomes 0.00. Then, press . After zero-point calibration, the procedure will automatically lead to slope calibration (displayed as “SLP”). If you do not need to make a slope calibration, press  to leave the calibration mode and back to measurement mode.

4. When selecting slope calibration, put sensor into flow-through chamber, and make the sample go into the chamber at least 15 minutes until the display value becomes stable. Use residual chlorine reagent (DPD-1) to make a measurement value bench mark, and compare with the online measurement.

5. Press  or  to make the display value as same as the bench mark value (ex: right illustration: 1.00ppm). Then, press  to finish the slope calibration and automatically leave calibration mode and return to the measurement mode.



8.5 Last Calibration Data



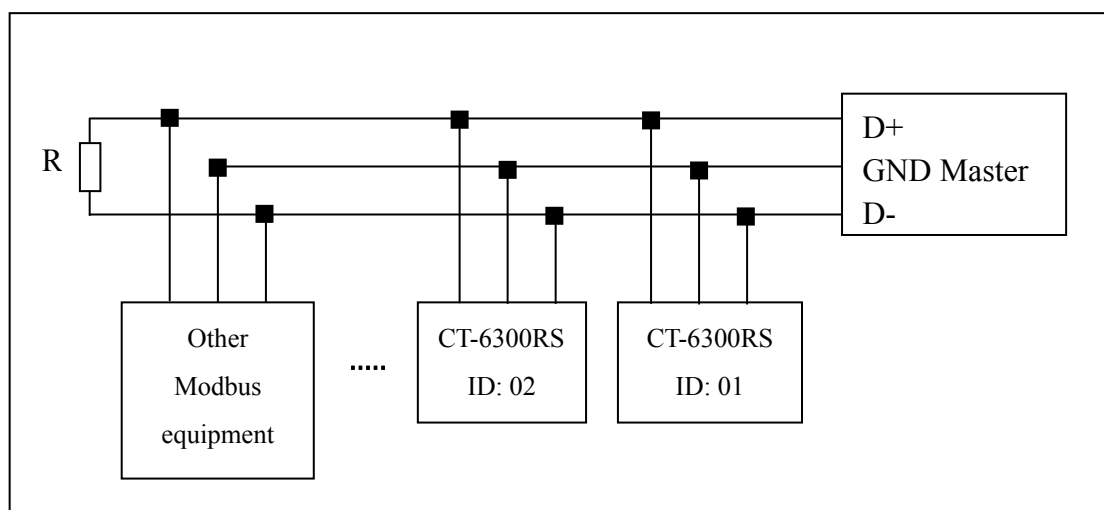
8.6 Attention of sensor usage

1. The transmitter is suitable both for 4-wire (voltage type) sensor and 2-wire (current type) sensor. (Note: “C” means residual chlorine sensor, “O” represents ozone sensor.)
2. Ambient temperature: -5~50°C (Auto temperature compensation, maximum temperature changes: less than 0.3°C/min.)
3. Maximum pressure— 1bar.
4. Applied flow: less than 30 L/hr. If the flow is under 15% of recommended speed, the measurement reaction can speed twice up.
5. Initialization time: the initialization time is about 1~3 hours. Reserved and re-initialization for measurement needs about 0.5~2 hours. After changing membrane or electrolyte, it needs about 0.5 hour for re-initialization. After clean electrode, it needs about 1~3 hours for re-initialization. Immerse the sensor into a stirred sample solution at least 15 minutes before each measurement.
6. **Ambient pH: the sample solution must be controlled within pH 5.5 ~ 8.0(especially for residual chlorine sensor) , and it must be under a stable pH condition.**
7. Calibration cycle: the sensor is not necessary for zero-point calibration. Use DPD-1 residual chlorine agent for slope calibration. If you need high accuracy measurement, it is recommended for making slope calibration method everyday.
8. Life of membrane: about one year, depends on sample solution.
9. Life of electrolyte: about 6~8 weeks, depends on sample solution.
10. Material - membrane cover: transparent PVC, electrode body: black PVC
Attention: The front white part of the sensor is membrane. Do not tear down the membrane, or it may not measure any more.

9. MODBUS protocol and instructions for CT-6300RS

9.1 Communication connection

The RS-485 communication port of the transmitter features with electronic isolation protection, lightning protection, and to provide internal independent ground solution. It is allowed to use normal twisted-pair (segregation double-stranded twisted pair cable) cable connections. All devices are in contact with a double-stranded, and then all together, and another line will be connected with all the negative contacts, and the isolated shield wire must be connected to GND. When we talk about communication in the laboratory, the stand-alone master-slave communication is relatively simple. Hence, it is allowed to consider using the normal cable instead. However, there should be strictly in accordance with the requirements of industrial engineering construction. Wiring diagram is as follows:



Note:

1. The RS-485 interface of CT-6300RS transmitter has a protective earth terminal. When communicate with the RS-485, there should use with solution ground to eliminate risk of safety.
2. It is allowed to use a 120 ohm impedance matching resistors at terminal equipment in the transmission lines (D +, D-) ends across to effectively reduce or eliminate signal reflection.
3. Without repeaters, the RS-485 network can not exceed a maximum of 32 nodes. The maximum communication transmission distance of RS-485 is up to 1200 meters.
4. When communication, all the equipments of the network should be maintained in the same transfer mode, baud rate, parity consistent. And each of the device address can not be the same, so as not to conflict resulted in the normal network communications.
5. The Modbus command of the transmitter can only access 50 registers. If it exceeds the length, then it returns abnormal message.

9.2 MODBUS name and address table

Function Code : 03H, 06, 10H Modbus response (setup parameter)

Logic address	Item	Number of Byte	Information type	Description of data transmission	Default value	Note
0001H	Equipment's ID	2	USHORT	1-247	1	
0002H	Transmitter model	6	USHORT	ASCII Code	CT-6300RS	
0005H	Communication protocol	2	USHORT	0: RTU	0	
				1: ASCII		
0006H	Serial transmission speed (Baud rate)	2	USHORT	0: 2400	3	
				1: 4800		
				2: 9600		
				3: 19200		
0007H	Parity	2	USHORT	0: None	1	
				1: Even		
				2: Odd		
0008H	Real-time clock*	12	USHORT	Second	2011-01-01, 00:00:00	
0009H			USHORT	Minute		
000AH			USHORT	Hour		
000BH			USHORT	Day		
000CH			USHORT	Month		
000DH			USHORT	Year		
000EH	Code setting*	2	USHORT	Code setting	1111	
000FH	Temperature mode*	2	USHORT	0: MTC	0	
				1: PTC		
				2: NTC		
0010H	WASH relay*	2	USHORT	0: OFF	0	
			USHORT	1: AUTO		
0011H		2	USHORT	ON.S: 0-9999	0	Second
0012H		4	USHORT	OFF.H: 0-999.9	0	Hour
0014H		2	USHORT	DB.S: 0-9999	0	Second
0015H	Relay 1 *	2	USHORT	0: OFF	1	
1: AUTO						
0017H		4	FLOAT	SP1	10.00ppm	Data affected by sign byte
0019H	4	FLOAT	DB1	0.10ppm		

001BH	Relay 2 *	2	USHORT	0: OFF	1	Data affected by sign byte
001DH		4		FLOAT		
001FH			4		FLOAT	
				DB2	0.10ppm	

0021H	Backlight Brightness *	2	USHORT	0: AUTO	2			
0022H				2			SHORT	1: ON
								2: OFF
	2: Highest bright	0						
	1: high bright							
0: Standard								
-1: Low bright								
0023H	Backlight Sensitivity*	2	SHORT	-2: Lowest bright	0			
				2: Highest Sensitivity				
				1: High Sensitivity				
				0: Standard				
				-1: Low Sensitivity				
-2: Lowest Sensitivity								
0024H	Sample average of measurements (Digital Filter) *	2	USHORT	1-60	5			
0025H-0030H	Factory reserved							

Note : The actions without * sign only support for function code 03H. The actions with * sign support function code 03H, 06H, 10H. USHORT data range from 0 to 65535, SHORT data range from -32768 to 32767. FLOAT is a 4 data bits IEEE 754 format float. The data range follows is the same.

Function code: 03H Modbus response (measurement parameter)

Logic address	Item	Number of Byte	Information type	Description of data transmission	Default value	Note
0031H	Number of measurement channels	2	USHORT	CT-6300RS only has one channel	1	
0032H	Sign byte	6	CHAR	pH		ASCII code
				ORP(mV)		
				uS/cm		
				mS/cm		
				MΩ-cm		
				ppt		
				ppm		
				mg/l		
				%		
				mA		
				°C		
				NTU		
FNU						
FTU						
0035H	Residual chlorine /Ozone measurement	4	FLOAT	Residual chlorine /Ozone measurement		Data affected by sign byte
0037H	Temperature measurement	4	FLOAT	Temperature measurement		
0039H-0050H	Factory reserved					

Important: Usage address please refer to 03H Modbus response (measurement parameter)

Function code: 01H Modbus response (dispersion parameter)

Logic address	Item	BIT	Description	Default value	Note
0070H	LO Alarm	1	Contact on	0 (Contact off)	
0071H	Hi Alarm	1	Contact on	0 (Contact off)	
0072H	mA too high	1	Contact on	0 (Contact off)	
0073H	mA too low	1	Contact on	0 (Contact off)	
0074H	Exceed temp. range	1	Contact on	0 (Contact off)	
0075H	Exceed Residual chlorine /Ozone range	1	Contact on	0 (Contact off)	
0076H	RLY1 Action *	1	Contact on	0 (Contact off)	
0077H	RLY2 Action*	1	Contact on	0 (Contact off)	
0078H	WASH Action*	1	Contact on	0 (Contact off)	
0079H	Measurement status	1	Contact on	1 (Contact on)	0: Hold 1: Measurement
007AH-0090H	Factory reserved				

9.3 Modbus example description(ex: function code 03H)

The following description takes the temperature reading(0037H) as an example. Set the temperature at the transmitter at MTC 25.1°C, and confirm that host and sub-machine communication format settings are correct. The host according to the following left table to send commands, and then to get the response from sub-machine according to following right table. This example shows the message transmission function code 03H data format. If under other function code, the logic mode is the same.

ASCII Mode:

Request		Response	
Message Framing	Hex	Message Framing	Hex
ID, Address	01	ID, Address	01
Function code	03	Function code	03
Starting Address Hi	00	Byte Count	04
Starting Address Lo	37	Register value Hi	CC
No. of Registers Hi	00	Register value Lo	CD
No. of Registers Lo	02	Register value Hi	41
LRC	C3	Register value Lo	C8
		LRC	56

RTU Mode:

Request		Response	
Message Framing	Hex	Message Framing	Hex
ID, Address	01	ID, Address	01
Function code	03	Function code	03
Starting Address Hi	00	Byte Count	04
Starting Address Lo	37	Register value Hi	CC
No. of Registers Hi	00	Register value Lo	CD
No. of Registers Lo	02	Register value Hi	41
CRC Check Lo	75	Register value Lo	C8
CRC Check Hi	C5	CRC Check Lo	65
		CRC Check Hi	5A

Note: FLOAT is a 32-bit IEEE 754 format. The above table, for an example, is divided into two 16-bit register data transmission. The back 16-bit register(CC CD) will be transferred first, and then the first 16-bit register (41 C8) will be transferred later. Every 16-bit format is high-bit in the front and low-bit in the post. For example, the temperature now is 25.1°C. The 16-bit of FLOAT data(Hexadecimal) will show 41 C8 CC CD. The transmission order is CC CD 41 C8.

10. Error messages (Error code)

Messages	Reason	Dispositions
	<p>Serious error that does not permit any further measuring</p>	<p>Please call service engineer.</p>
	<p>SLOPE value exceeds the upper or lower limit</p>	<p>Maintain the electrode or change a new electrode, and make another calibration.</p>
	<p>OFFSET(zero-point electric potential) value exceeds the upper or lower limit</p>	<p>Maintain the electrode or replace the electrode, and make another calibration.</p>

11. Maintenance

Generally speaking, under normal operation, the controller produced by our company need no maintenance except regular cleaning and calibration of the electrode to ensure accurate and stable measurement and system operation. When the sensor cannot be calibrated or has too much error, please follow the instruction below to maintain the sensor.

1. Please pull out the sensor from the flow-through chamber. Clean the sensor's membrane with tap water (low flow) to remove the contamination above the sensor head.
2. Lightly rotate and remove the sensor's membrane cover. Check whether the upper and lower filter membranes of the sensor are broken or not. If yes, please replace with a new membrane kit. If not, remove the coating material (ex: rust) by immersing the sensor membrane into 5% HCL (for over a night).
3. Clean negative (silver) pole and positive (golden) pole:
Gently clean the negative pole and positive pole with clean water. If you still find some contamination, take action by following instruction.
 - (1)Negative (silver) pole: You can gently rub the negative(silver) pole with fingers. Do not use other tool to clean to prevent scraping.
 - (2)Positive (golden) pole: You can gently rub the positive (golden) pole with fingers. However, if there is water stain on the golden pole, or if the oxidation is difficult to clean, you may use micro-particle sandpaper to gently rub the surface of positive (golden) pole.
4. After cleaning it, please make dry it by sun-shine, drain out the water inside by fill in electrolyte.
5. Fill in the electrolyte into membrane cap until it is 80% full(do not contain any bubble). Then, gently tight the cap up to the sensor. After tight up, reverse the sensor to see if there is any bubble in side the membrane cap. (If yes, please open the cap, and re-fill in the electrolyte. After the clean procedure, please follow this operation manual to finish installation and calibration procedures.



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